Chapter 1

Probability and Distributions

1.2.1 Part (c): $C_1 \cap C_2 = \{(x, y) : 1 < x < 2, 1 < y < 2\}$.

1.2.3 $C_1 \cap C_2 = \{\text{mary,mray}\}$.

1.2.6 $C_k = \{x : 1/k \le x \le 1 - (1/k)\}$.

1.2.7 $C_k = \{(x, y) : 0 \le x \le 1/k, 0 \le y \le 1/k\}$.

1.2.8 $\lim_{k\to\infty} C_k = \{x : 0 < x < 3\}$. Note: neither the number 0 nor the number 3 is in any of the sets C_k, $k = 1, 2, 3, \ldots$

1.2.9 Part (b): $\lim_{k\to\infty} C_k = \phi$, because no point is in all the sets C_k, $k = 1, 2, 3, \ldots$

1.2.11 Because $f(x) = 0$ when $1 \le x < 10$,

$$Q(C_3) = \int_0^{10} f(x)\, dx = \int_0^1 6x(1 - x)\, dx = 1.$$

1.2.13 Part (c): Draw the region C carefully, noting that $x < 2/3$ because $3x/2 < 1$. Thus

$$Q(C) = \int_0^{2/3} \left[\int_{x/2}^{3x/2} dy \right] dx = \int_0^{2/3} x\, dx = 2/9.$$

1.2.16 Note that

$$25 = Q(\mathcal{C}) = Q(C_1) + Q(C_2) - Q(C_1 \cap C_2) = 19 + 16 - Q(C_1 \cap C_2).$$

Hence, $Q(C_1 \cap C_2) = 10$.

1.2.17 By studying a Venn diagram with 3 intersecting sets, it should be true that